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GEOLOGIC MAP OF NORTH AMERICA*
A REVIEW

BY

E. C. CASE

AND

W. L. G. JOERG

It is with much pleasure that one welcomes this map, which is a revision, on the same scale, of the map issued at the Tenth International Geological Congress which met in the City of Mexico in 1906, and it is with increased pleasure that one considers the minute care and skilful workmanship which has gone into its preparation. An increased brilliancy of colors makes it less pleasing in general effect at the first glance than the original, but one soon forgets this in appreciation of the increased clarity of the boundaries accomplished by the change. Perhaps only in one or two cases is there any lack of contrast in the different areas. The Middle and Upper Ordovician (No. 17) is not easily distinguished in some cases, notably where it is next to or surrounded by the Pennsylvanian (No. 12), as in west central Arkansas.† The addition of small numerals inserted to aid in the identification of formations is also a valuable innovation.

Turning naturally to Alaska to see what has been accomplished in that Territory we are struck by the fact that some parts which were filled in on the first map have been left bare or have been considerably revised. The region around Point Barrow is now left bare, and the country between the Noatak and the Selawik Rivers is now mapped only in the immediate valleys of the Kobuk and the Selawik Rivers. The portion of the Alaska Peninsula marked Jura-Trias on the older map is now shown as Marine Jura, and the area mapped is confined to the eastern end of the peninsula. The lower portion of the valley of the Koyukuk River is given only as Lower Cretaceous, and the portion of the valley of the Yukon below the mouth of the Koyukuk and the region northwest of this to the coast is marked Upper Cretaceous. Between the Matanuska and the Susitna Rivers a considerable area is left blank, and along the upper portion of the Tanana River there is a change from metamorphosed Paleozoic sediments and intruded pre-Cambrian igneous to metamorphosed pre-Cambrian with supposed Paleozoic and Mesozoic and post-Cambrian intrusives. The great area along the border line between the Yukon and the Mackenzie Territories left blank in the earlier map is now filled in with the same formation as lies to the west, metamorphosed Paleozoic sediments.

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* GEOLOGIC MAP OF NORTH AMERICA. Compiled by the United States Geological Survey in cooperation with the Geological Survey of Canada and Instituto Geologico de Mexico, under the supervision of Bailey Willis and Geo. W. Stose. Scale, 1:5,000,000. Pl. I. *U. S. Geol. Survey*, *Prof. Paper* 71, 1911. Also sold separately: price, 75 cents.

† This indistinctness is due to a fault in the color plate. In other regions where the Pennsylvanian and the Ordovician adjoin, as, for instance, in northern Illinois, the colors are readily distinguishable.—ASST. ED.

Turning towards the central portion of Canada and the northeast quarter of the map we note very few changes in the mapping of the Canadian Shield or the Arctic Archipelago. The map of Greenland is greatly improved by the more complete sketching in of the glaciers. Pre-Cambrian intrusives are now shown on the southern end of Greenland and for some distance up the southern end of the eastern side. The coast beyond Cape Brewster is mapped in considerable detail, Jurassic, Triassic and Devonian being shown; the extreme northeastern part of the coast is still left blank.

Newfoundland, Prince Edward Island and New Brunswick are left practically unchanged. In the vicinity of Moosehead Lake there are a few changes consisting mostly in the extension of the Cambrian and the inclusion of a strip of Ordovician in a northeast-southwest direction across Moosehead Lake.

In the portion of Canada north of New York and Vermont there are several changes in the valley of the St. Lawrence River and in the region to the east, notably the subdivision of the part previously marked Cambrian into Cambrian-Ordovician and Ordovician.

In the southeast quarter of the map the chief changes are in the mapping of the Piedmont Plateau and the Atlantic Coastal Plain. The outlines of the Newark formation are changed somewhat in the former, but the chief changes are those in the regions marked pre-Cambrian and metamorphosed Paleozoic sediments in the old map, which are now referred in large measure to pre- and post-Cambrian intrusives, and the inclusion of some Cambrian and lower Ordovician in Virginia as well as in North and South Carolina. The area of Lower Cretaceous in North Carolina is greatly limited by the mapping of larger areas of pre- and post-Cambrian intrusives. The coastal plain of North Carolina and the northern portion of South Carolina is changed by the increase in the area of the Lower Cretaceous and the limitation of the Miocene. On the coast from the central portion of New Jersey to Florida there is mapped a strip of Quaternary of greater or less width. This is extended around the borders of the Gulf Coastal Plain and includes most of the southern half of Florida. Notable also is the inclusion of a strip of marine Oligocene which appears in South Carolina and, taking in the northern half of Florida, extends around the whole of the Gulf Coastal Plain. The Eocene of the Coastal Plain is less changed. It is somewhat limited in area in Georgia, and a strip is included in the Mississippi Embayment on the west side of the Mississippi River, extending as far south as Helena in Arkansas. In the same region the Cretaceous is carried around the north end of the Eocene so that it reaches as far north as Cairo.

The mapping of the Appalachian mountain region is only changed in minor details. The same may be said of most of the northern part of the Mississippi Valley. In Minnesota a large area previously marked as Eo-Algonkian and pre-Cambrian is now considered as Upper Huronian. A large area of pre-Cambrian is recognized along the course of the Red River of the North in North Dakota, and the area along the course of the Minnesota River is increased. The Sioux Quartzite is reduced in area in Minnesota.

Returning to the south we find that in Cuba Upper Cretaceous, Triassic and Jurassic are substituted for pre-Cambrian in the western end and post-Cambrian intrusives for pre-Cambrian igneous in the eastern part. There is little change on the eastern side of Mexico, beyond the separation of the extremity of the peninsula of Yucatan as Pliocene from the bulk of the peninsula, which is reckoned as early Tertiary. On the western side of Mexico the peninsula of Lower California is altered by the continuing of the post-Cambrian intrusives down the center as far as Cabo Virgenes and Punta Abrojos. The lower end is marked as Upper Cretaceous. In the north central portion of Mexico the Tertiary and later effusives are limited by the extension of the Quaternary and the mapping of a considerable number of isolated areas of lower Cretaceous.

The western portion of the United States, shown in the south-west quarter of the map, has, as is to be expected, many changes. The blank in the southwestern part of Texas is filled in by the mapping of Tertiary and later effusives and by a small area of Ordovician and Permian. The great blank in central New Mexico is filled in largely with undifferentiated Carboniferous, and the Triassic is carried down the eastern side of the Pecos valley as far as Roswell. The blank in the southern parts of Arizona and California is filled in with Quaternary and isolated masses of pre-Cambrian and, in southeastern Arizona, isolated masses of Paleozoic. The blank in northeastern Arizona and southeastern Utah is filled with Jura-Trias, with a small center of upper Cretaceous. The adjacent portions of Colorado, Utah and Wyoming around the Uinta Mountains is marked as covered by continental Eocene, as is the region in northwestern New Mexico at the head of the San Juan River; both of these were formerly marked as Eocene, but the true nature of the deposits was not indicated.

There are numerous changes in the mapping of details in the front ranges of the Rocky Mountains, but they can hardly be described in a limited review. The valley of the South Platte around Greeley and Denver is still marked as Laramie. The portion of South Dakota including the Big Bad Lands and the valley of the North Platte in western Nebraska and eastern Wyoming are mapped as continental Oligocene. A great area in western North Dakota, northwestern South Dakota, eastern Wyoming and Montana· formerly called Laramie is now marked as continental Eocene with a fringe of doubtful Laramie or basal Eocene.

The great expanse of Cretaceous marked on the earlier map in northern Montana is further broken by the introduction of the uplifts of the Big Snowy Mountains and similar smaller areas just east of the Little Belt Mountains. West of the Little Belt Mountains the Belt Terrane occupies a wide strip running north nearly to latitude 52° N. and replacing the metamorphosed Paleozoic rocks of the earlier map. In northern Montana there is a detailed mapping of the Montana coal bearing formation; this is continued into Alberta and Saskatchewan as far north as the Saskatchewan River.

In the northwestern part of the State of Washington the effusive igneous rocks near the coast are changed to Marine Jurassic. The great blank in southern Idaho and Nevada and northwestern Utah is filled with Tertiary effusives and Quaternary. The blank on the coast of northern California is filled by the mapping of Jurassic rocks, and the central portion of the Klamath Mountains is recognized as Paleozoic instead of pre-Cambrian. E. C. C.

In addition to the above appreciation of the geologic subject-matter of the new Geologic Map of North America a few words regarding its cartographic and geographic aspects may not be out of place.

The polyconic projection used on the map of 1906 has been retained for the new edition, in spite of intervening valid adverse criticism of its appropriateness[*]. The system of coordinates, however, has been changed on the present edition, the parallels being drawn at an interval of 4° and the meridians of 6°. They have been made to coincide with the limits of the sheets of the International Map of the World, 1:1,000,000. The letters and numerals adopted to designate the sheets of that map have been added in red along the border of the continent and on the edge of the map. On land the meridians and parallels have been drawn for every degree. The marking of every second degree, both of latitude and of longitude, not only on the edge of the map as a whole, but on the border of each individual sheet, is also a valuable innovation. Localizing is further greatly facilitated by the far more copious topologic nomenclature.

The geologic color scheme is more detailed in the new edition than it is in the old. Forty-two separate symbols are shown on the former instead of twenty-five on the latter. The grouping of the symbols in the legend is far more synoptical, as distinction is made between the symbol used for a group of undifferentiated formations and the subdivisions of the same group, as, for instance, undifferentiated Carboniferous, on the one hand, and, on the other, Permian, Pennsylvanian, Mississippian. The color sequence again follows the prismatic system in general: the greatest noticeable difference being in the change of the tone representing the Ordovician from pink on the previous edition to gray on the new. A valuable innovation is the addition, on the border of each sheet, of all formational symbols used on that sheet, thus doing away with the necessity of consulting the sheet which contains the legend.

As a product of the printer's art the map is of the best. That supreme test of accurate map reproduction, the proper superimposition of colors, is most successfully met. The forty-two colors of the map, which necessitated fourteen separate printings, register perfectly. The language of the Geological Survey *Press Bulletin* is modest, indeed: "It is believed that there are few if any other establishments in the United States capable of turning out such a production."

With regard to the geographic content of the map, attention must be called to the fact that the quality of the geologic mapping represented is not of uniform value for all regions. Thus, while the formational boundaries and designations are practically correct for the United States and southern Canada, the mapping of the northern parts of Canada is of a very general nature. In this it reflects the character of the standard Geological Map of Canada, 1:3,168,000, 1901, which has probably in part been used as a source. The designation, on the present edition, of the Mackenzie Mts. (forming the divide between the upper system of the Yukon and the Mackenzie), for instance, as belonging to the Paleozoic system, although they were left blank in the edition of 1906, is based alone on reconnaissance surveys, viz., those of Keele and Camsell.[†] The seemingly less comprehensive delineation of the geology of Alaska, as compared with that on the edition of 1906, referred to in Professor Case's review, is due to the fact that, for this region, only areas actually surveyed have been included on the present edition.

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[*] Cf. Kartenkunde, by E. Gelcich, F. Sauter, and P. Dinse, 3rd edition, revised by M. Groll, Leipzig, 1909, p. 104.

[†] Cf. *Annual Report*, Geol. Survey, Canada, Vol. 16, 1904, sub-reports C and CC; and Publ. No. 1097, Geol. Survey, Canada, 1910; also *Bull. Amer. Geogr. Soc.*, Vol. 42, 1910, pp. 176 and 779–780.

The greatest blemish on the map, from the geographic point of view, is its total ignorance of the results of the Mylius Erichsen Expedition of 1907-08. The absence of the characteristic Northeast Foreland of Greenland on a map bearing date of 1911 is a *lacuna* indeed, which, in this case, is emphasized all the more by the relatively large scale of the map. The inclusion of the geology of regions not belonging to North America, such as Iceland, northern Colombia and northwestern Venezuela shows that it is the intention of the compilers to portray the entire area enclosed within the borders of the map and renders difficult the validity of an excuse for the above omission. The non-inclusion of Hansen's survey of the King Haakon VII Coast of Victoria Island is further evidence of unfamiliarity with recent explorations—a condition unfortunately already apparent on the edition of 1906, which failed to show the result of Amdrup's survey in 1898-1900 of the coast of King Christian IX Land of Greenland (34°-25° W.). It is only fair to state that this omission has been rectified on the present edition.

These criticisms, however, must in no way be allowed to obscure the fact that the new edition of the Geologic Map of North America is the unquestioned standard in its field. It is indeed fortunate for us, with our dearth of private map-publishing houses doing constructive work of a scientific nature, that such institutions as the Geological Survey do not conceive their work to be limited to the production of raw material, but extend their field of activity to synthesis and generalization. For this, geography—for are not these two qualities its very philosophy of life?—and especially American geography, should be extremely grateful.

W. L. G. J.

GEOGRAPHICAL RECORD

THE AMERICAN GEOGRAPHICAL SOCIETY

MEETINGS OF THE SOCIETY. A regular meeting of the Society was held at the Engineering Societies' Building, No. 29 West Thirty-ninth Street, on Tuesday evening, Nov. 21, 1911. Vice-President Greenough in the Chair. The following persons recommended by the Council were elected to Fellowship:

Miss Mura Bayly,
Eugene S. Benjamin,
Samuel S. Dennis,
H. Palmer Gallaher,
Lawrence Lewis Gillespie,
William J. Matheson,
Dr. Francisco P. Moreno,
George B. Shattuck,
John T. Terry, Jr.,
Theodore Dehon Wilson,
Edwin O. Wood,
C. Wickliffe Yulee.

The Chairman then introduced Prof. Charles E. Fay, recently President of the American Alpine Club, who addressed the Society on "The Majesty of the Mountain." A large number of stereopticon views were shown.

A meeting of the Society was also held at the same Hall on December 26,